

Battaglia, Frank

From: Lynch, Joanne [Joanne.Lynch@aecom.com]
Sent: Wednesday, June 19, 2013 1:02 PM
To: Battaglia, Frank
Cc: Joseph Guarnaccia; Hellerich, Lucas; Beeler, Malcolm
Subject: BASF 180 Mill St, Cranston, RI - Final SRI Workplan Addendum
Attachments: SRI Workplan Addendum Final.pdf; RE: BASF Cranston RI - SRI Workplan Addendum, Response to EPA Comments

Frank –

Attached is the revised and Final SRI Workplan Addendum for Former Ciba-Geigy Site at 180 Mill St, Cranston, RI. The text and table were changed to reflect EPA comments on using 25 mg/kg as a decision point when evaluating PCB soil concentrations. Also attached is your email dated June 11, 2013 granting approval based on this change.

Our schedule is to have the surveyors complete the grid this week and begin soil sampling on Monday, June 24. We estimate about 6 days of field work for the soil sampling. The Waterloo profiler work and groundwater sampling is scheduled to begin July 8.

Thank you and we look forward to working with EPA to achieve Site closure. Please do not hesitate to contact myself or Joe Guarnaccia at BASF if you have any concerns or comments.

Best Regards,
Joanne

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June 18, 2013

AECOM Project No. 60297249

Via Electronic Mail
(battaglia.frank@epa.gov)

Mr. Frank Battaglia
US.EPA Region I
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Mail Code: OSRR07-3
Boston, MA 02109-3912

**RE: Former Ciba-Geigy Facility, 180 Mill Street, Cranston, RI
Supplemental Remedial Investigation (SRI) Work Plan Addendum
Additional PCB and VOC Characterization**

Dear Mr. Battaglia,

This is a Work Plan Addendum to the Supplemental Remedial Investigation Work Plan for the former Ciba-Geigy Facility at 180 Mill Street, Cranston, RI (the "Site"). Following implementation of the Supplemental Remedial Investigation (SRI) Work Plan, a Draft SRI Report was submitted to EPA for review (November 2012). This Work Plan Addendum presents additional Site characterization activities to fill gaps identified in the Draft SRI Report.

1.0 Introduction

Based on the analysis of the data collected during the implementation of the SRI Work Plan, additional groundwater sampling is needed to determine whether Site COCs are migrating to the Pawtuxet River located southeast of the Site. The outcome of this additional investigation will be used to evaluate remedial actions in a future Focused Feasibility Study (FFS). In addition to groundwater sampling and analysis for Site COCs, monitored natural attenuation (MNA) parameters will be collected and used to assess remedial alternatives in the FFS.

After submission of the Draft SRI Report, EPA requested that all historical Polychlorinated Biphenyl (PCB) samples in soil be presented on maps to show contaminant distribution and sample density. That map was provided to EPA on December 11, 2012. Based on review of the data presented, the EPA, in an email dated January 15, 2013, requested that BASF collect additional soil samples for PCB analysis, and that these samples be at a frequency of a 15 to 20 ft spaced grid around existing areas of PCB impact. The areas of PCB impacts are shown on Figure 2 as the shaded areas. In addition, EPA requested that additional soil samples be collected for PCB analysis to evaluate historic excavation areas.

This Work Plan Addendum is intended to cover the rationale and scope of the additional activities required to further evaluate Site remedial alternatives.

1.1 Project Objectives

The primary objectives of this Supplemental RI addendum is to complete the characterization of the nature and extent of PCBs in soil and VOCs in groundwater and based on these characterizations

evaluate remedial alternatives and design remedial actions to support regulatory closure and Site reuse.

The data quality objectives (DQOs) of this phase of investigation are:

1. To collect and evaluate groundwater data to support regulatory closure of the Site, by quantifying Site COC concentrations and monitored natural attenuation parameters (MNA) present in groundwater within the former Production Area that may affect long-term groundwater quality.
 - These additional data will be used to confirm where residual mass is present in the subsurface, confirm the primary transport pathways, and identify how the plume is attenuating along those pathways.
 - Groundwater data will also be collected from existing wells and evaluated to identify whether PCB compounds are present in the aqueous phase.
 - These additional groundwater data will be used in a focused feasibility study that will identify a proposed remedial action for groundwater.
2. To collect and evaluate soil data to characterize PCB concentration distribution in soil to support regulatory closure of the Site under TSCA.
 - These additional data will be used to characterize PCB distribution in shallow soil in conformance with applicable TSCA and site-specific rules.
 - These additional soil data will be used in a focused feasibility study that will identify a proposed remedial action for soil.

This Work Plan Addendum describes the field activities that will provide additional data to meet the stated objectives. The activities described in this Work Plan include:

- Groundwater sampling and analysis of existing Site wells using low flow sampling methods to update data at existing locations with current contaminant concentrations (VOCs and PCBs) as well as MNA parameters.
- Groundwater grab sampling and analysis from two transects to collect supporting data to evaluate Site COC (VOCs only) presence/absence along the southern Site boundary, including measurement of hydraulic conductivity using a hydraulic profiling tool to characterize the primary transport pathways.
- Surface and subsurface (vadose zone) soil sampling and analysis from areas within the Site identified as containing PCB impacted soil.

All field sampling activities will be conducted in accordance with the requirements outlined in the site-specific Health and Safety Plan (HASP) (AECOM, 2012), QAPP (AECOM, 2012) and Project Operating Procedures (POPs) described in the SRI Work Plan.

1.2 Project Description

Based on the data collected during the implementation of the SRI Work Plan, additional groundwater sampling is needed to determine whether Site COCs are migrating to the Pawtuxet River located southeast of the Site. The outcome of this additional investigation will be used to evaluate remedial actions in a future Focused Feasibility Study (FFS). In addition to groundwater sampling and analysis for Site COCs, monitored natural attenuation (MNA) parameters will be collected and used to assess remedial alternatives in the FFS.

On the southern parcel, the soil is impacted by PCBs. In 1995/1996 Ciba-Geigy completed an interim removal measure (IRM) to address PCBs in shallow soil and collected many samples to

verify the remedy. In 2012, the IRM work plan to which this Appendix is attached was implemented to verify the IRM data and to fill data gaps for both regulatory approval and redeployment.

Following implementation of the SRI Work Plan, EPA requested that additional soil samples be collected for PCB analysis to evaluate historic excavation areas. Total data review in the context of current EPA rules for PCBs indicates that the remedy will include:

1. Removal of soil with PCBs >50 milligrams per kilogram (mg/kg), based on EPA Region I input for the Site; and
2. Capping of all residual soil with PCBs <50 mg/kg and >1 mg/kg.

Therefore, additional data are required to delineate the PCB soil impacts to support remedial measures consistent with the above-referenced rules. In an email dated, January 15, 2013, EPA requested that samples be collected at four depth intervals (0-6 inches, 1-2 ft bgs, 2-4 ft bgs, and 4-6 ft bgs) within the southern parcel Production Area on a 20 ft by 20 ft grid spacing that surrounds previous soil detections and would support a risk-based closure under the Toxic Substances and Control Act (TSCA) §761.61. The areas of PCB impacts are shown on Figure 2 as the shaded areas. Information from previous Site investigations and assessments as well as input from EPA Region I were used to identify the shaded areas and sampling locations necessary to fill PCB data gaps.

Soil samples will be collected at all proposed PCB sample locations (shown on attached Figure 2) at the following depths; 0-0.5 ft bgs, 1-2 ft bgs, 2-4 ft bgs, and 4-6 ft bgs. As discussed below, **the samples will be analyzed in a sequential manner to effectively characterize the target 50 mg/kg and 1 mg/kg concentration levels to support a FFS.** Proposed samples are grouped into areas for discussion purposes (see Figure 2 and Table 1). Horizontal delineation will be performed to determine PCB concentrations to less than 1 mg/kg as per EPA rule. In the vertical, delineation in the upper two feet to less than 1 mg/kg is necessary in some locations so as to determine the depth of potential removal actions. Delineation in the vertical below two feet to <1 mg/kg is not deemed as necessary given a capping remedial action, but data must be available to indicate that PCB concentrations >50 mg/kg are likely not present based on a weight-of-evidence approach.

1.2.1 Groundwater Sampling and Analysis Approach

Additional groundwater sampling activities will further characterize site-related groundwater discharge to the Pawtuxet River as well as biogeochemical characteristics of the groundwater. The outcome of this additional investigation will be used to evaluate remedial actions in a future Focused Feasibility Study (FFS).

Groundwater grab samples will be collected at four locations along the upgradient edge of the bulkhead wall using a Geoprobe (see Figure 1). From each location, groundwater grab samples will be collected from discrete depths (three or more) that have higher hydraulic conductivities, for analysis of VOCs to assess potential discharge of impacted groundwater to the Pawtuxet River. To meet this objective hydrogeological characterization will be conducted using a hydraulic profiling tool (HPT). The use of the HPT will allow data to be collected from conductive zones of the aquifer and the results will include a tabulated physicochemical and index of hydraulic conductivity as well as plots of these data at each location. No soil samples will be collected during the advancement of the boreholes. The combination of the HPT groundwater grab sampling will allow for the targeting of specific vertical and horizontal intervals for remedial evaluation.

Additional groundwater grab samples will be collected from three locations along the south/southwestern property boundary to assess potential migration of Site COCs from and/or to the abutting property. Groundwater grab samples will be collected from discrete depths (two or

more) at these locations using HPT to identify the most conductive intervals. No soil samples will be collected during the advancement of the boreholes. The groundwater grab sampling will allow for the targeting of specific vertical and horizontal intervals for remedial evaluation. Permeability testing also will be completed in these intervals using a HPT.

One round of low flow groundwater sampling will be conducted in six monitoring wells along the bulkhead wall (MW-29D, P-30D, MW-31S, MW-31D, MW-2S, P-35S) for Site COCs (VOCs and PCBs) to supplement the effort described above.

One round of low flow sampling will be conducted in five impacted monitoring wells along the plume centerline (MW-34D, MW-102D, MP-31 S, P-2S, MW-21S) to assess the current concentrations of COCs (VOCs by EPA Method 8260 and PCBs by EPA Method 8082) and current MNA parameters (TOC, Sulfate, Nitrate, Iron (total and dissolved), Fe(II) (total and dissolved), methane for remedial evaluation. In three of the monitoring wells located along the plume centerline (MW-34D, MW-102D, MP-31S), groundwater will be collected and analyzed for microbial censuses deemed critical for remediation of Site COCs (Chlorinated benzenes CENSUS, Aerobic and anaerobic BTEX CENSUS, sulfate reducing bacteria, methanogens, denitrifiers, EBAC CENSUS, chlorotoluene CENSUS).

1.2.2 Soil Sampling and Analysis Approach

The Southern Production Area where past PCB concentrations in soil have been identified was divided into areas for discussion purposes (see Figure 2 and Table 1). The On-Site Soil Interim Remedial Measures (IRM) that were completed in 1996 (Woodward-Clyde) indicate that four phases of soil excavation occurred in Central Areas 1, 2, 3, and River Areas 2 and 3. These areas are shown on the figure. Soil sampling depths in this work plan consider the depths of the previous excavations and post-excavation confirmation samples (sample series CF- shown on the map). Where clean fill and/or a confirmatory data point are present, no additional data collection at those depths is proposed (note the sample location color-coding indicates the proposed sample depths).

Soil sampling methods will follow those described in Section 3.2 of the SRI Work Plan to which this Appendix is attached. The sampling approach for each area is summarized below and PCB analysis refers to PCB Method 8082 with SOXHLET extraction.

A sampling decision matrix is described below and summarized on Table 1.

Border Area – Two rows of samples along the northern perimeter of the southern Production Area. The goal of the sampling in this area is to establish the northern perimeter for cap construction (≤ 1 mg/kg), where data available indicate that PCB concentrations from 1-10 mg/kg are present to the south of this area. In the vertical, delineation should be nearly complete to less than 1 mg/kg but is not entirely necessary assuming a cap is a presumptive remedy in this area. To achieve the objective the following sampling protocol is proposed:

- Analyze samples from 0-0.5 ft bgs along all of Row 1 (row closest to the Production Area).
- If all samples from 0-0.5 ft bgs are <1 mg/kg, then no additional analyses are required.
- For sample results that are >1 mg/kg total PCBs, analyze sample from 1-2 ft bgs at the sample point, and all samples from 0-0.5 ft bgs at abutting grid locations in Row 2.
- Continue analysis of samples from abutting grid locations at 0-0.5 ft bgs and 1-2 ft bgs until delineation of impacts to <1 mg/kg is complete or no other samples are available to analyze.
- If samples in Row 2 (the northernmost row) exceed 1 mg/kg then additional sampling may be necessary. Data review will be required to determine if the sampling is needed.

- If samples in the two rows from 1-2 ft bgs exceed 1 mg/kg, then data review will be necessary to determine if additional sample analysis from deeper depths is required.

River Area 1 – This area includes a group of samples to be collected in the northeast corner of the Southern Production Area abutting the river and mostly within the 100-year flood plain. Two surface soil samples (0.5-1 ft bgs) and one soil boring sample (4-6 ft bgs) have PCB concentrations between 10 and 50 mg/kg. One surface soil sample (0.5-1 ft bgs) has PCB concentrations between 1 and 10 mg/kg. The goal of sampling in this area is to delineate impacts to the upper two feet of soil assuming a cap is a necessary remedial action. It is assumed that all impacts >1 mg/kg will need to be removed because the cap must be <1 mg/kg and elevations in this area must be held at current grade because the location is within the 100-year flood plain (no net fill requirement). This sampling and analysis will cover characterization for on- and off-site disposal purposes as well as to demonstrate that soil beneath the cap depth (0-2 ft bgs) is <50 mg/kg for cap construction. If the surface soil data are sufficient to delineate impacts then a limited number of samples analyzed from 2-4 ft bgs will be sufficient.

- Analyze samples from 0-0.5 ft bgs and 1-2 ft bgs at each proposed sample location across the grid.
- Analysis of additional sample results will depend upon analytical results and the conceptual site model:
 - If PCB concentrations are found to increase with depth it will be necessary to analyze samples from 2-4 ft bgs and 4-6 ft bgs to delineate impacts. These samples will be selected from the sample location with the result and from abutting grid locations.
 - If PCB concentrations are >25 mg/kg at 1-2 ft bgs then samples from 2-4 ft bgs at the sample location and abutting grid locations will be selected for analysis.
- If all cap depth (0-2 ft bgs) soil sample results are <25 mg/kg, then up to 6 samples from 2-4 ft bgs will still be submitted for analysis.

River Area 2 – This area includes a group of samples to be collected on the east side of the Southern Production Area abutting the river. One surface soil sample and one soil boring sample have PCB concentrations between 10 and 50 mg/kg. Two soil boring samples have PCB concentrations between 1 and 10 mg/kg. The goal is to delineate impacts to the upper two feet of soil assuming a cap is a necessary remedial action. It is assumed that all impacts >1 mg/kg will need to be removed because the cap must be <1 mg/kg and floodplain no net fill applies in this area. This sampling and analysis will cover characterization for disposal purposes as well as demonstrating that soil beneath the cap depth (0-2 ft) is <50 mg/kg for cap construction. If the surface soil data are sufficient to delineate impacts then a limited number of samples from 2-4 ft bgs will be sufficient.

- Analyze samples from 0-0.5 ft bgs and 1-2 ft bgs at each proposed sample location across the grid. Note that within IRM excavation limits and where post-excavation confirmation data exist, shallow samples are excluded from collection (see Figure 2).
- Analysis of additional sample results will depend upon analytical results and the conceptual site model:
 - If PCB concentrations are found to increase with depth it will be necessary to analyze samples from 2-4 ft bgs and 4-6 ft bgs to delineate impacts. These samples will be selected from the sample location with the result and from abutting grid locations.

- If PCB concentrations are >25 mg/kg at 1-2 ft bgs then samples from 2-4 ft bgs at the sample location and abutting grid locations will be selected for analysis.
- If all cap depth (0-2 ft) soil sample results are <25 mg/kg, then up to 3 samples from 2-4 ft bgs will still be submitted for analysis.

River Area 3 – This area includes a group of samples to be collected in the southeast corner of the Southern Production Area abutting the river. Previous analytical results are more variable and there are several sample results >50 mg/kg. The goal of the sampling will be focused on delineating the area >50 mg/kg to allow for segregation of wastes that will be generated during excavation. There doesn't appear to be a zone within this area that could be potentially clean enough to allow for use of the soil as part of a cap.

- Analyze samples from 0-0.5 ft bgs, 1-2 ft bgs, and 2-4 ft bgs at each proposed sample location across the grid. Note that within IRM excavation limits and where post-excavation confirmation data exist, shallow samples are excluded from collection (see Figure 2).
- Additional analysis of samples from 4-6 ft bgs if sample results are >25 mg/kg at 2-4 ft bgs.

Central Area 1 – This sampling area is located to the south of the Border Area and west of River Area 1. There is one surface soil location with >50 mg/kg and numerous sample locations with PCBs >10 mg/kg. The goals of sampling in this area are to delineate volumes >50 mg/kg and to characterize PCB impacts to soil. It is believed that much of this soil will remain in place as long as >50 mg/kg soil is removed and the cap can be constructed over the area.

- Analyze samples from 0-0.5 ft bgs and 1-2 ft bgs at each proposed sample location across the grid. Note that within IRM excavation limits and where post-excavation confirmation data exist, shallow samples are excluded from collection (see Figure 2).
- Analysis of additional sample results will depend upon analytical results and the conceptual site model:
 - If PCB concentrations are found to increase with depth it will be necessary to analyze samples from 2-4 ft bgs and 4-6 ft bgs to delineate impacts. These samples will be selected from the sample location with the result and from abutting grid locations.
 - If PCB concentrations are >25 mg/kg at 1-2 ft bgs then samples from 2-4 ft bgs at the sample location and abutting grid locations will be selected for analysis.
- If soil sample results from 0-2 ft bgs adequately delineate the impacts then additional deep samples will not be required.
- If soil samples from 1-2 ft bgs are >25 mg/kg, then samples from 2-4 ft bgs will still be submitted for analysis. The number of samples will be determined based upon the results from 1-2 ft bgs.

Central Areas 2 and 3 – These groups of sampling areas are located on the west side of the Southern Production Area. There are numerous samples with total PCBs >50 mg/kg and numerous sample locations with PCBs >10 mg/kg. The goals of sampling in this area are to delineate the area that is >50 mg/kg (for disposal and segregation) and to characterize PCB impacts to soil. It is believed that much of this soil will remain in place as long as >50 mg/kg soil is removed and the cap can be constructed over the area. Grades may need to be maintained on the western perimeter to match grades with the road.

- Analyze samples from 0-0.5 ft bgs, 1-2 ft bgs, and 2-4 ft bgs at each proposed sample location across the grid. This is deemed necessary as this portion of the Site has more

significant impacts. Note that within IRM excavation limits and where post-excavation confirmation data exist, shallow samples are excluded from collection (see Figure 2).

- Analysis of additional sample results will depend upon analytical results and the conceptual site model:
 - If PCB concentrations are found to increase with depth it will be necessary to analyze samples 4-6 ft bgs to delineate impacts. These samples will be selected from the sample location with the result and from abutting grid locations.
 - If PCB concentrations are >25 mg/kg at 2-4 ft bgs then samples from 4-6 ft bgs will be analyzed at the sample location and abutting grid locations.

Historical building construction photographs and Site investigations indicate that concrete pilings and other obstructions are present below ground surface in River Areas 2 and 3 and Central Areas 2 and 3. If refusal is encountered at a grid node, that location will be abandoned.

1.3 Data Evaluation and Reporting

Data collected from this addendum to the SRI Work Plan will include:

- A summary evaluation of data quality
- An update of the PCB in soil and VOCs in groundwater discussion of the nature and extent of contamination
- Clarification/refinement of the conceptual site model
- Presentation of data that facilitates remedial development alternatives
- Data tables and figures
- Focused feasibility study for soil and groundwater remediation of the Mill Street Site. The FFS will include, but not be limited to, detailed discussions of the following:
 - Remedial action objectives and goals for chemical-, action-, and location-specific potential standards, criteria, regulatory requirements, and guidelines;
 - General response actions and identification of remedial technologies for groundwater and soil;
 - Initial screening of remedial technologies for groundwater and soil (e.g., no action, institutional control, monitored natural attenuation (MNA), in-situ groundwater and soil treatment, chemical injection, excavation, capping);
 - Detailed analysis of retained remedial alternatives for groundwater and soil including description and assessment;
 - Comparative analysis of remedial alternatives considering overall protection of human health and the environment, compliance with Site cleanup goals, reduction of toxicity, mobility, and volume, short term effectiveness, long term effectiveness and permanence, implementability, land use, sustainability, and cost.
 1. It is assumed that the comparative analysis of soil will include the following remedial alternatives: no action, excavation, and capping.
 2. It is assumed that the comparative analysis of groundwater will include the following remedial alternatives: no action, MNA, pump

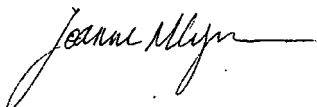
and treat, and in-situ groundwater and saturated soil treatment. It is possible that the additional groundwater characterization activities will indicate that only the "no action" and "MNA" alternatives are reasonable to evaluate.

- o Recommended remedial alternative.

These results will be presented as an addendum to the SRI Report.

Please contact Joe Guarnaccia with BASF at (732) 762-4743, or the undersigned if you have any questions about this work plan. Thank you for assistance with this project.

Sincerely,
AECOM



Joanne M. Lynch, P.Eng.
Project Manager

cc. Joseph Guarnaccia, Ph.D., BASF
Lucas Hellerich, Ph.D., AECOM
Malcolm Beeler, AECOM
Dave Espy, AECOM

Enclosures

Table 1	Decision Matrix for PCB Study Areas
Figure 1	Proposed Groundwater Sample Locations
Figure 2	Proposed PCB Sample Locations

Table 1 – Decision Matrix for PCB Study Areas

Study Area	Phase I		Phase II	
	Action	Result	Action	
Border Area	Analyze samples from 0-0.5 ft bgs along all of Row 1.	If all samples from 0-0.5 ft bgs are <1 mg/kg, then delineation complete.	Design remedial action in this area	
		For sample results that are >1 mg/kg total PCBs, then proceed to Phase II.	Analyze sample from 1-2 ft bgs at the sample point, and all samples from 0-0.5 ft bgs at abutting grid locations in Row 2. Continue until delineation complete or until no other samples are available.	All sample Samples
River Area 1 River Area 2 River Area 3 Central Area 1	Analyze samples from 0-0.5 ft bgs and 1-2 ft bgs at each proposed sample location across the grid. (0-0.5 ft bgs samples from IRM excavations will be collected beneath the depth of fill placed in the excavation)	If PCB concentrations increase with depth then analyze samples from 2-4 ft bgs and 4-6 ft bgs to delineate impacts.	Design remedial action in this area	
		If PCB concentrations are >25 mg/kg at 1-2 ft bgs then analyze samples from 2-4 ft bgs at the sample location and abutting grid locations will be selected for analysis.	Design remedial action in this area	
		If all cap depth (0-2 ft bgs) soil sample results are <25 mg/kg, then up to 6 samples from 2-4 ft bgs will still be submitted for analysis.	Design remedial action in this area	
Central Areas 2 & 3	Analyze samples from 0-0.5 ft bgs, 1-2 ft bgs, and 2-4 ft bgs at each proposed sample location across the grid.* (0-0.5 ft bgs samples from IRM excavations will be collected beneath the depth of fill placed in the excavation)	If PCB concentrations >25 mg/kg at 2-4 ft bgs then analyze samples from 4-6 ft bgs at the sample location and abutting grid locations.	Design remedial action in this area	
		If PCB concentrations <25 mg/kg at all 2-4 ft bgs sample locations then analyze selected number of samples from 4-6 ft bgs	Design remedial action in this area	

* Note that within IRM excavation limits and where post-excavation confirmation data exist, shallow samples are excluded from collection (see Figure 2).